THE ROLE OF TECHNOLOGY IN THE 21ST CENTURY ART ROOM

By

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July 2013

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Abstract

How are art teachers today utilizing computer technology in the classroom and what role do they feel it should serve in art education? The purpose of this study was to explore how elementary art educators in North Carolina schools are integrating computer technology into instructional delivery. The answers to these questions may provide art educators with more effective strategies for infusing computer technology into future classroom instruction.

A total of eighty-six survey responses provided by elementary art teachers in the state of North Carolina comprised the data sample for this study. The study participants teach grades kindergarten through fifth in elementary schools across the state. The measuring instrument used to gather and tabulate data was the statistical software program Qualtrics. Surveys were made available to art teachers through online art

education venues and emails. The data was analyzed and presented in graph and chart form in this thesis.

It was hypothesized that as art teachers gain greater access to classroom based computer technologies they will both use those technologies more frequently and develop more favorable attitudes regarding computer technology usage in the classroom.
The data did support the hypothesis. Results showed that greater access to computer technology correlates with increased technology integration and teachers having more favorable beliefs about technology usage in the classroom. Surveys demonstrated art teachers are frequently using computer technologies in their classrooms and many view computer technology favorably.

The study outcomes give art teachers insight into how other art teachers are using computer technology in their classrooms and what types of use are most successful. Art teachers may have fewer opportunities for collaboration with one another since most schools only have one art teacher. This study offers art teachers the opportunity to see how other art educators are incorporating computer technologies in the classroom. This valuable insight into what types of computer technology usage are perceived as most useful can help others who may be uncertain how to incorporate computer technology in the classroom with useful integration strategies.

THE ROLE OF TECHNOLOGY IN THE 21ST CENTURY ART ROOM

Presented to the Faculty of the School of Art and Design

East Carolina University

In Partial Fulfillment

Of the Requirements for the Degree

Master of Arts in Education in Art Education

By

David Diehl

July 2013

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DEDICATION

To my parents, Lou and Judy Diehl, who instilled in me the importance of education

and

to my wife Kate, my biggest supporter.

ACKNOWLEDGEMENTS

I would like to thank my thesis committee: Dr. Robert Quinn, Dr. Cynthia Bickley-Green, Dr. Borim Song, and Dr. Bethann Fine. Thank you for all of your help, wisdom, and guidance. I could have not done this without each of you.

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CHAPTER 1: INTRODUCTION

Significant changes in the field of art education have taken place during the past few centuries resulting in fundamentally different approaches to art teaching and practice through the years (Eisner & Day, 2004). Recent shifts in the landscape of public education have resulted in far greater emphasis being focused on the importance of computer technology in the schooling process. Access to computer technology has greatly expanded for many schools in the preceding decades and new technologies now permeate many facets of everyday life. While computer technology becomes further enmeshed into the fabric of school curriculums, it is pertinent to consider how art teachers are responding to this new reality.

A generally accepted viewpoint is the notion that today's students need to be technologically literate while progressing through school and life. Educational policy makers and scholars increasingly focus on what educators need to learn about and do with technology (Delacruz, 2009). Based on this line of inquiry, what role will art educators perform in the overall educational framework to facilitate dynamic instruction that utilizes technology? As teachers look for new ways to utilize technology in the curriculum, some instructional methods will be more effective than others. On a technology usage spectrum proposed by Marc Prensky (2005), some teachers will employ a mix of restrained usage while staying within their comfort zones, whereas others will look for new ways to embrace new digital possibilities. A number of teachers in the middle will exhibit a combination of both approaches. Recent literature seems to suggest that art teachers are embracing computer technology to a limited degree (Roland, 2007). Impediments to full integration include teachers' resistance to change (Hubbard, 1995),

limited number of computers in each art room, time restraints, and narrow uses of technology in instruction (Prensky, 2007). The purpose of this study is to examine these challenges and other aspects regarding technology use for art instructors.

Recent pedagogical approaches suggest many art educators and students, to varying degrees, are in regular contact with different forms of technology. From Internet access to video games and iPhones, various technologies are easily accessible to many students both at home and in school. Unfortunately, home experiences interacting with technologies may follow historic class trends, whereas the most affluent and middle class students tend to have the most opportunities and therefore enter school "naturally" superior in their use of technology (Jenkins, 2009). This disparity, or "digital divide", characterizes the gap between "those individuals and communities that have, and do not have, access to the information technologies that are transforming our lives" (Dickard & Schneider, 2002, para. 1). Referring to computer use as "ever less a lifestyle option, ever more an everyday necessity" (p. 19), author Manuel Castells (as cited in Jenkins, 2009) calls the inability to use computers or navigate the Internet "a matter of stigma, of social exclusion, revealing not only changing social norms but also the growing centrality of computers to work, education and politics" (p. 19). Schools that prepare students with valuable technology interactions may serve as a bridge to students who have home lives devoid of such opportunities. It behooves art teachers to be aware that incorporating technology bolsters the limited technology interactions some students have.

In addition, technology writers distinguish between technology used to create digital imagery or digital art and Internet and information communications technology usage, or ICT as authors Wilks, Cutcher, & Wilks (2012) describe it. This study focuses

more on the latter. Although some elementary art teachers may provide opportunities for digital art, this study examines how new computer technologies are being used to facilitate and enhance instruction. Based upon feedback from North Carolina elementary art educators, this research provides insight into the experiences of art teachers working with computer technology and explores the role of computer technology in a subject area that has traditionally been hands-on. The data compiled in this study will outline what types of technology are most frequently utilized in elementary art classrooms in the state of North Carolina and which technology-based instructional methods are considered to be most effective by the teachers using them.

Statement of the Problem

The purpose of this study was to explore the role of computer technology in 21st century art classrooms. Specifically, this study examined how elementary art educators in North Carolina schools are incorporating computer technology in classroom instruction. Through surveys with elementary art educators, data was collected outlining what types of technology are most frequently utilized in art classrooms and which ones are considered most effective by the teachers using them. The purpose of taking such a comprehensive look at various aspects of computer technology usage in today's classrooms was to gain insight into such a significant component of 21st century education. Three broad questions were addressed: (1) What are the different types of computer technology being used in art education today? (2) What are teachers' attitudes and beliefs regarding computer technology in art education? (3) What kinds of relationships are there between beliefs and computer technology usage in art education?

This research also addressed other issues and questions surrounding the topic of computer technology in art education. Central questions relevant to this research included: How are art teachers incorporating computer technology in instructional delivery? Do art educators believe computer technology helps enhance instructional delivery? How frequently do art teachers use computer technology and what obstacles do art teachers encounter that keep them from using computer technology more often? To examine this research problem further, the following questions were also asked: As computer technology becomes increasingly utilized in schools, and society for that matter, what are the implications for art education in the future? Is it really as necessary in a subject like art, where traditionally the visual arts have tended to be more tactile and tangible, that art teachers incorporate computer technology with the same fervor as their general education peers? The answers to these questions may provide art educators with better strategies for incorporating computer technology into future classroom instruction.

CHAPTER 2: REVIEW OF THE LITERATURE

As new computer technologies have developed over the years, artists have often recognized their importance and found ways to incorporate them in art making processes. Wilks et al. (2012) note that visual arts history and the traditions of art making and visual literacy have often been complemented by the development of technologies. According to Robyler and Doering (as cited in Wilks et al., 2012), "over the centuries, technologies have often provided the tools, materials, and processes" that have creative and artistic expression (p. 55). Nonetheless, Wilks et al. (2012) view technology as a means to aid the artistic process, but not an end in itself.

With the advent of the Internet, increasingly advanced computing capabilities, and greater access to information, some art educators recognized years ago the possibilities of technology in relation to the field of art education. As educator Elizabeth Delacruz (2004) points out, art educators have extolled the importance of embracing new computer technologies for more than 20 years. From digital art images to online instruction, Delacruz describes the range of possibilities promoted by educators in the field. Many of these art educators point to the parallels between technology and art education, and stress the many virtues of the medium and the importance of embracing the possibilities of electronic technologies in art education (Delacruz, 2004). Although early proponents identified and wrote about the possibilities of technology, the reception by art educators has been mixed at times and the implementation of technology in schools has been an evolving process. Although access to technology has greatly expanded over the past decade, many art teachers are still hesitant or unsure how to utilize technology in the creative process (Black & Browning, 2011).

Current studies show that students spend more time today interacting with technology, both in and out of school, than ever before (Unrath, 2011): today's students are multitaskers, digitally versed, and technology driven. Authors Taylor and Carpenter (2007) explore the notion of "digital kids" and the concept that many students are in frequent contact with different formats of technology. This approach reinforces the concept that in this digital age it seems necessary for art educators to seriously consider the role of technology in an increasingly digital and globally competitive world.

A number of new technologies have entered classrooms on a wide scale in the past decade including: computers, the Internet, digital projectors, digital cameras, document cameras, interactive whiteboards, and digital tablets. Technologies such as these can "make possible new forms of social interaction" (NAEA, 2009, p. 6) in that users can digitally share artwork in an online community. Art education blogs, websites, and various online formats enable artworks to be uploaded and shared with a global audience where feedback can be given (NAEA, 2009).

The acceptance of technology as a vital medium for learning is apparent both in the United States and abroad. According to the Common Core state standards "just as media and technology are integrated in school and life in the twenty-first century, skills related to media use are integrated throughout the standards" (Common Core State Standards Initiative, 2010, para. 12). Technology integration is a central tenant of 21st century skills outlined in the North Carolina Information & Technology Essential Standards (ITES). According to the North Carolina Department of Public Instruction (NCDPI), the ITES are "critical building blocks for the education of our students" that enable to students to develop the right "technology skills and knowledge" necessary to

"achieve success at the next level" (p. 1). From a global perspective, the International Society for Technology in Education (ISTE) has developed National Educational Technology Standards (NETS) that outline how teachers should be using technology in the teaching process. These standards are well regarded worldwide and set parameters for "best practices in learning, teaching, and leading with technology in education" (NETS, 2013, para. 4).

As schools integrate more technology into curriculum, traditional forums for learning, such as classrooms, are no longer the only option as more learning takes place outside of the classroom through e-learning. E-learning, according to the eLearnNC website (n.d.), is utilizing electronic technologies to access educational curriculum outside of a traditional classroom. E-learning can include online instruction and virtual learning opportunities via the Internet. Today, the Internet enables teachers and students to digitally access educational information from a vast number of resources. Instead of the traditional dynamic of instructors solely transmitting content to students, information can more readily be sought out by students thus enabling them to play a more central role in their own learning. This new approach is in contrast to traditional modes of learning which tend to be "passive, lecture driven, hierarchical, and largely unidirectional from instructor to student" (Davidson, 2010, p. 50).

Robert Quinn (2011) calls attention to the collaborative aspect and potential of e-learning in regards to the artmaking process. In an interconnected and digital world, students must learn how to work together and collaborate. From web conferences to social networking sites, the internet provides "virtual spaces" where users can collaborate and share ideas. These virtual spaces can be used by students to collaborate by sharing

and discussing artworks. Quinn (2011) notes the importance of the social and collaborative aspect of the learning process, and he feels that educators would be wise to consider such avenues as components of the learning process.

As the world has become more technologically dependent, policy makers and school leaders have called for more technology in schools. The consensus seems to be an acknowledgement by most of the teaching profession that technology is here to stay and something that is a valuable part of the teaching process. But does this mean technology necessarily enhances art education instruction? Does technology benefit students in the art room as it would in other classes such as math or reading?

Some art educators would agree with the notion that art education does benefit from computer technology. Black and Browning (2011) argue that digital technology in art education does not inhibit creativity but instead "allows and encourages users to access their creative selves" (p. 20). Educator Craig Roland states that the arts have "always been on the cutting edge of new technologies" and "the more technologies and the more materials we can use in the classroom, the better the chances are that each child will find a medium to express themselves" (as cited in Ash, 2008, Digital Approach to Art Ed, para. 11). Black and Browning (2011) note that the world is changing and today's students are continually immersing themselves in the latest interactive technologies. From this standpoint, it only makes sense that art educators adapt to these realities and incorporate new digital technologies into teaching processes. Delacruz (2009) views art education as "a good fit with new digital media" (p. 15) since students can become familiar with "new media literacies" such as social media formats, which encourage collaboration, social skills, and interconnectedness, all traits that align well with art

education aims and are characteristics of an increasingly globalized and competitive work force.

Other educators would counter that the experiences provided through traditional visual arts teaching, such as hands on activities, material practice, art demonstrations, and face to face art discussions, already encourage 21st century skills, such as curiosity, problem solving, creativity, and critical thinking, and it is unnecessary to change what already works. Degennaro and Mak call attention to the notion that computers, often associated with the technical and mechanical, can "impede the creative process" (as cited in Delacruz, 2011, p. 20). According to Eisner (as cited in Wilks et al., 2012) the art processes that enable us to better understand the world are made possible through "manipulating materials and employing artistic actions" (p. 55). Delacruz (2004) sees the value in both computer technology and more traditional teaching methods, but makes the following point:

> The art room should be a place for a kind of learning about the far reaches of human experience, in a way that is compelling, complex and fluid in nature, and delightfully self-contradictory. Computers have the potential to facilitate this kind of learning environment, but so does a robust conversation about art, face-to-face. (p. 16)

Although not necessarily anti-technology, Hausman (2000) notes that a vital component of a visual arts education is the concept of material practice. Wilks et al. (2012) expand on this premise by stating that working with materials "is fundamental in visual arts education-you cannot fully understand art without making art" (p. 55). The concept of

material practice reflects the inherent dichotomy between more traditional, tactile creative processes and newer, digitally focused approaches to art education.

Technology will continue to play a critical role in art education, but the level to which it will be utilized is largely influenced by the teacher. Even though technology access in schools has greatly improved over the last decade, some studies show that art teachers may still be hesitant or unsure of how to effectively utilize computer technology in art instruction (Roland, 2007). As more art teachers gain access to computer technology, some may still be unsure of whether it is necessarily vital to the content of the art curriculum. For example, some teachers still prefer traditional approaches over digitally focused content delivery. Traditional approaches to teaching art education include: Viewing tangible artworks and visuals, assembling collections of art prints, using paper based assessments and rubrics, having art demos at a table, passing around artworks, such as clay, for students to handle, photographing artworks on film, painting on a surface, hanging artworks around the room, and sharing and discussing artworks with classmates. Newer technology-based approaches to art instruction include: Viewing artworks digitally and online, assembling artworks for viewing through a digital format such as PowerPoint, using a document camera to demonstrate an art process, photographing artworks with a digital camera, painting on a whiteboard with digital software, displaying student projects with a digital projector, and sharing and discussing artworks through online forums.

Statement of Hypothesis

Rapid developments in computing capabilities have characterized the early years of the 21st century. From businesses to schools to personal use, computers are an integral part of daily life for many people. Now ubiquitous, computer technology has been embraced by schools nationwide as many districts strive to expand avenues of access (Delacruz, 2009). As Delacruz (2009) describes this trend, "families, students, and communities are plugged in, cued to the latest electronic developments and diversions, ready to creatively adapt them to their own purposes" (p. 13).

From the advent of the printing press to the modern computer, new technologies have often been received by the public with varying levels of support. Each successful technology goes through different phases of reworking and refinement. As technologies become more integral to modern life, more people tend to become users. At this point, computers are here to stay and are considered a vital instructional tool within the education establishment. Taking into account the non-uniform acceptance of new digital tools, art teachers will most likely embrace new technologies in staggered stages with varying levels of enthusiasm.

Like other educators, art teachers will most likely feel the pressures of incorporating technology into the teaching process as access expands. Yet, art teachers may be more resistant to using technology in a subject area that has traditionally been dominated by non-electronic media. As art classrooms acquire more forms of computer technology, will art educators become more comfortable with utilizing those technologies? It is hypothesized that greater access to computer technology correlates

with increased technology integration and teachers having more favorable beliefs about technology usage in the classroom.

CHAPTER 3: METHOD

Participants

The data for this study was gathered from 86 elementary art teachers from across the state of North Carolina, as was approved by the East Carolina University IRB (see Appendix A). Participants were notified of the study through a monthly newsletter made available on the North Carolina Art Education Association (NCAEA) website and through direct emails to art educators throughout the state. A letter of support for this research was provided by the NCAEA president (see Appendix B). The research participants possessed anywhere from 0 to 20+ years of teaching experience and were between 20 and 61+ years of age. The participants were also asked to indicate whether they were male or female. 89% of respondents were female and 11% were male.

Instrument

A computer technology usage survey (See Appendix C) based on the Teachers' Attitudes Toward Computers Questionnaire (Christensen & Knezek, 1998) and the Survey of Teachers' Attitudes Toward Information Technology (Christensen & Knezek, 1998) was devised and made available electronically to elementary art teachers across the state of North Carolina. The survey was designed to garner insight into computer technology access and how teachers are utilizing computer technology in art education (See Appendix C). Originally, the survey was to go to art teachers within one county, but due to my ongoing interest in this topic I decided to expand the survey to include art teachers from across the state.

The survey was constructed using a cross-sectional design intended to capture a snapshot of current attitudes, beliefs, and behaviors regarding computer technology usage by elementary art teachers. Survey questions covered topics including demographic information, attitudinal perceptions regarding computer technology usage, computer technology access and usage habits, and barriers to integrating computer technology in art instruction. The survey utilized a combination of both quantitative and qualitative elements in order to capture a fuller understanding of computer technology usage by art educators. Survey questions consisted of structure and unstructured items. Structured items were used in the majority of sections on the survey due to their reliability and analyses benefits. Unstructured items were used to gather further information not gathered from the structured responses.

The survey instrument was intentionally designed in an easy to read format so that respondents could complete the survey in a short period of time thus promoting survey completion rates. An introductory section outlining the details of the study was followed by three sections pertaining to demographic information. The next three sections of the survey, sections 4, 5, and 6, were composed of attitudinal questions structured in a likert format. The remaining sections of the survey were composed of a mixture of structured response questions and open-ended questions.

Experimental Design

The design used in this study was a cross sectional survey utilizing both quantitative and qualitative research methods. This mixed method approach was desired because the data could reflect more specific and nuanced responses. A mixed method

approach incorporates qualities of both quantitative and qualitative research in order to parse the statistical results more fully than using one method alone (Gay, Mills, & Airasian, 2012). This survey provided both a snapshot of current behaviors and teachers' perceptions regarding computer technology in the classroom.

Procedure

The survey was made available through online resources for art teachers. An online format was chosen due to ease of accessibility and minimal requirement of respondents' time investment. For the purpose of this study, an electronic version of the survey seemed to be the best way to reach a broad demographic of art teachers and also minimize barriers to survey participation. The benefits of web based surveys have been documented in the literature and include speed and timeliness, convenience, low cost, and ease of data entry and analysis (Evans & Mathur, 2005). Although shortcomings of web based survey approaches, such as lower response rates (Yan & Fan, 2010), were taken into consideration, the potential benefits of an online survey approach outweighed any potential drawbacks.

Survey data was tabulated and analyzed with the online computer software Qualtrics. Responses were tabulated with this software to ensure human error would not be a factor in the statistical analysis process. All steps were taken to ensure reliable analysis of the data.

In the sections of the survey intended to gauge respondents' attitudes, the questions were formatted in a likert type structure consisting of five different response categories. Depending on how participants' responses were positioned on the scale, a

more or less favorable attitude was attributed to each response. Responses were classified into favorable and less favorable categories based on the data.

For closed ended questions, responses were tallied and conveyed through both pie chart and graph form. Responses were ordered from greatest to least and analyzed using both percentages and numbers relating to the total number of responses.

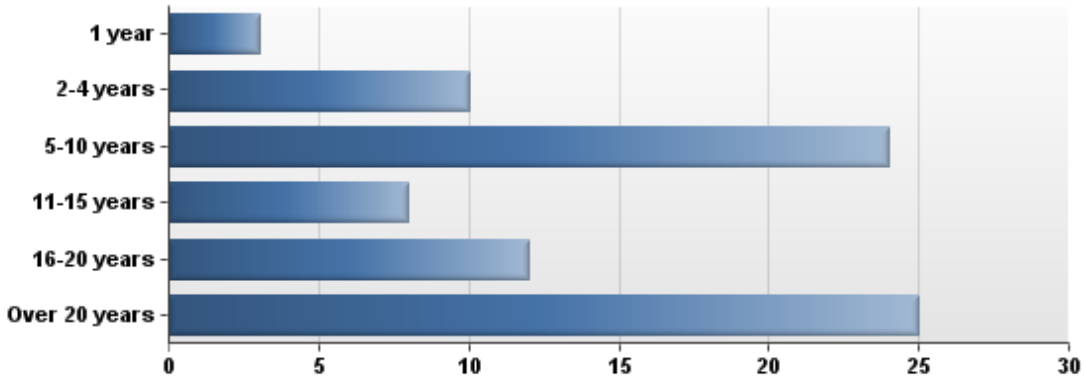
Coding was utilized to analyze open ended responses on the survey. Specific words or phrases relevant to the survey questions were identified during the data analysis. Relevant key words or phrases frequently cited and reoccurring in the open ended responses were tallied and recorded using percentages and numbers.

CHAPTER 4: RESULTS

For the purpose of this study, electronic surveys were made available to elementary art teachers across the state of North Carolina. The data of responses were analyzed using both quantitative and qualitative methods. The data illustrated teacher demographics, teachers' attitudes regarding computer technology, and usage habits in elementary art rooms. The results of the study were computed and presented in bar and pie graph form.

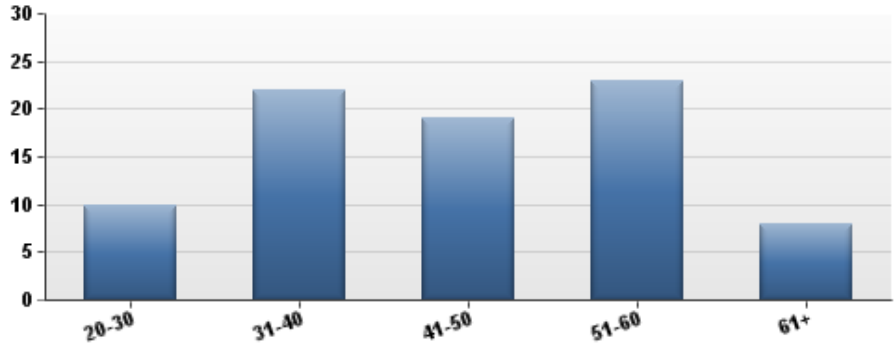
A total of 86 elementary art teachers from the state of North Carolina participated in the study. Participants were representative of a diverse range of years of teaching experience. There were 3 teachers with one year of experience teaching, 10 teachers with 2-4 years, 24 teachers with 5-10 years, 8 teachers with 11-15 years, 12 teachers with 16-20 years, and 25 teachers with over 20 years experience (See Figure 1). The bulk of survey responses came from teachers with 5-10 years and over 20 years of teaching experience (See Figure 1).

Figure 1. Years of Teaching Experience.



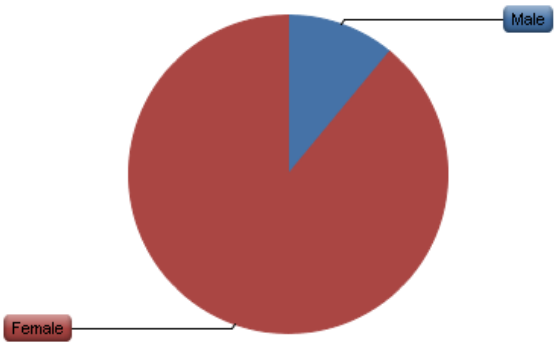
Survey respondents were representative of a diverse range of ages. 10 respondents identified themselves as being between the ages of 20 and 30, 22 respondents were between the ages of 31 and 40, 19 respondents were between the ages of 41 and 50, 23 respondents were between 51 and 60 years of age, and 8 respondents identified themselves as being 61 years of age or older (See Figure 2).

Figure 2. Years of Age



Respondents were able to provide demographic information related to gender. The majority of respondents were female, a minority were male. Of the 82 answers provided for this question, 73 respondents identified themselves as being female, and 9 identified as being male (See Figure 3).

Figure 3. Gender



In sections 4, 5, and 6 of the survey, participants were presented with a series of attitudinal statements regarding computer technology usage in art education. Questions were formatted based upon a likert scale structure. Respondents were asked to mark the answer that best signified their opinion regarding each statement. A response of "S" signified that the respondent strongly agreed with the statement, an "SA" signified the respondent somewhat agreed, a "U" signified the respondent was undecided, an "SD" signified the respondent somewhat disagreed, and a "D" signified the respondent strongly disagreed (See Figure 4).

In each instance where a statement was positively phrased, for example "the challenge of learning about computers is exciting" or "I would like to learn more about computers" a majority of respondents marked S or SA (See Figure 5). In response to the statements, "Learning to operate computers is like any new skill – the more you practice the better you become" and "Knowing how to use computers is a worthwhile skill", respondents unanimously answered either S or SA (See Figure 5). 80 of the 82 answers provided for the statement "I feel computers are necessary tools in both educational and work settings" were either an S or SA (See Figure 6). A high total of S and SA responses to positively phrased questions on the attitudinal portion of the survey are indicative of a positive attitude towards computer technology usage. An analysis of this collection of responses seems to suggest that art teachers are both embracing the importance of learning how to use computer technologies and viewing computers as vital components of the modern classroom.

Some survey questions garnered less uniformly favorable responses regarding attitudes towards computer technology. For example, when posed with a negatively

phrased statement such as, “Computers frustrate me” more disparity was apparent in the answers provided. While 55 of the 81 total responses to this question were either SD or D, 19 participants marked S or SA thus signifying the participant identified with this negative sentiment (See Figure 4). Additionally, in response to the statement “computers are difficult to understand” 57 respondents marked either SD or D, whereas 17 individuals marked either SA or S (See Figure 5). The data from these two statements suggest that teachers experience a measurable amount of frustration when working with computer technologies. These negative statements received a high total number of SD or D responses signifying a negative attitude toward particular aspects of computer technology usage. This frustration may be attributable to the challenges associated with learning how to use, rely on, and operate various computer technologies. Nonetheless, responses to questions on sections 4, 5, and 6 of the survey would seem to suggest an overall appreciation and affinity towards computer technology usage in the art room.

Figure 4. Attitudinal Questions Regarding Computer Technologies in the Art Room

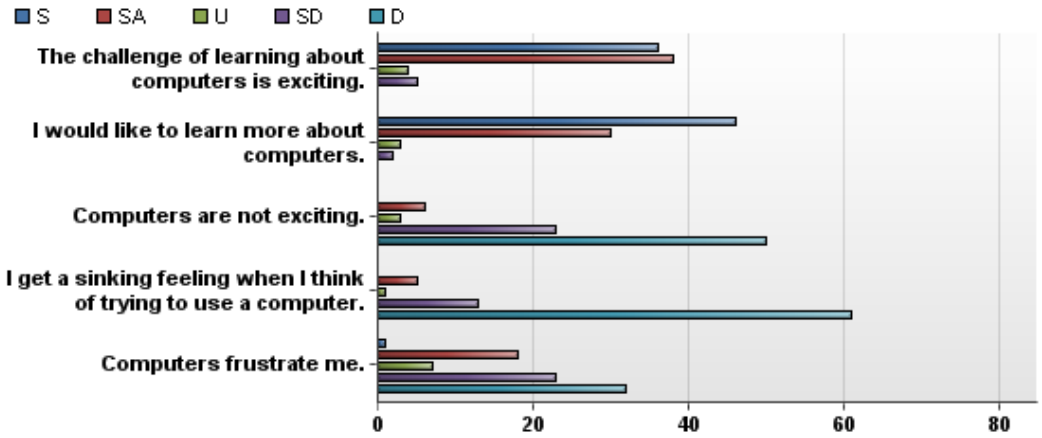


Figure 5. Attitudinal Questions Regarding Computer Technologies in the Art Room

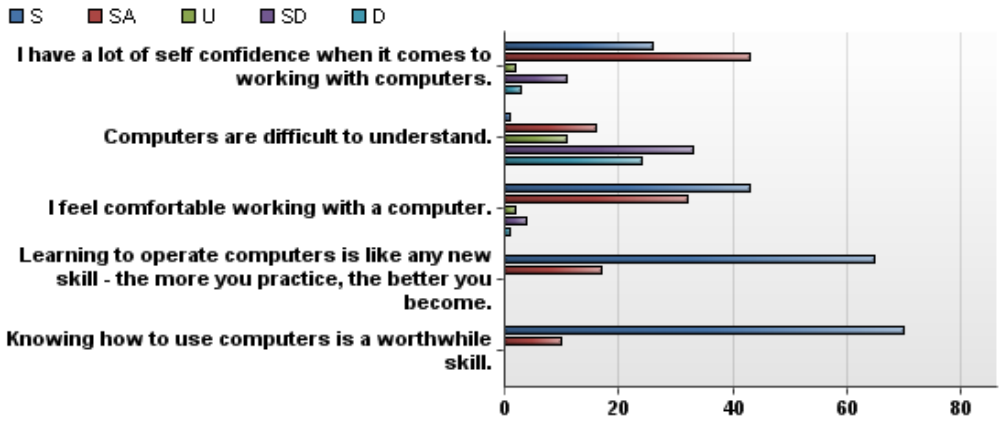
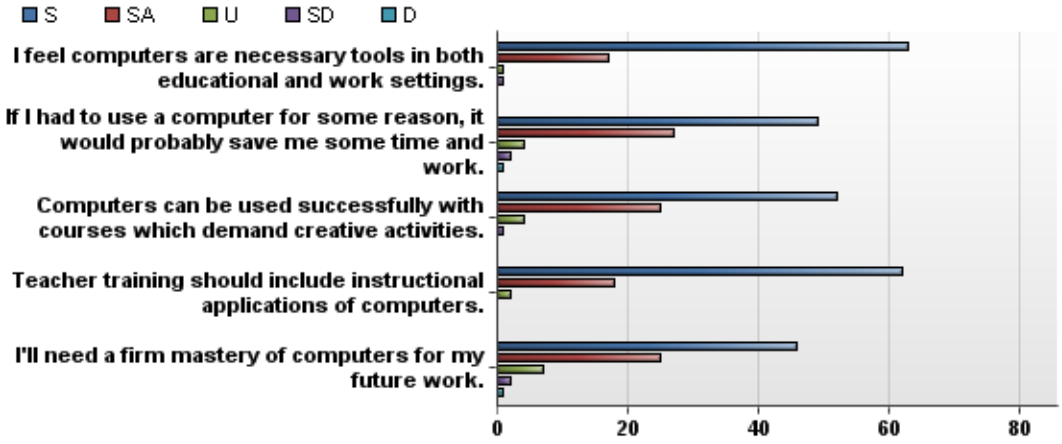


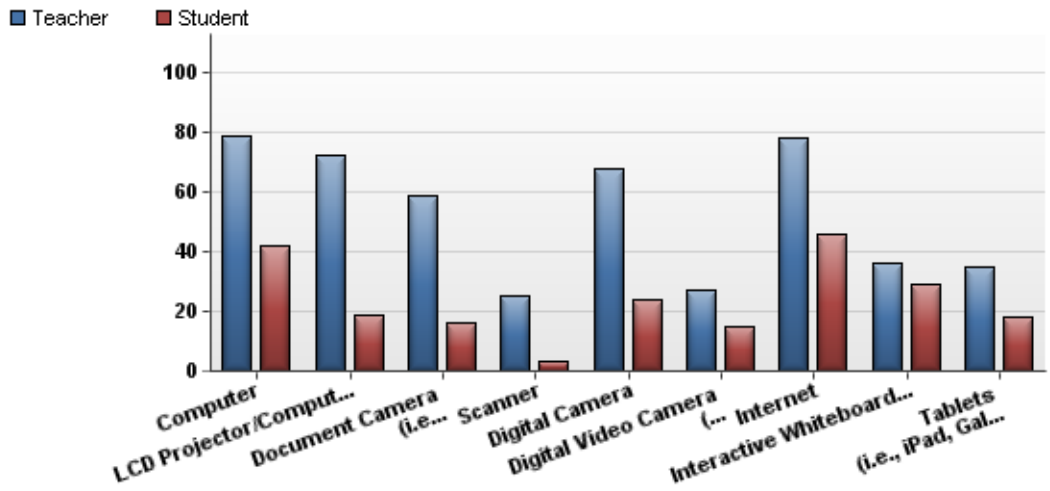
Figure 6. Attitudinal Questions Regarding Computer Technologies in the Art Room



In the next portion of the survey, teachers were provided with a list of nine different computer technologies and asked to identify which computer technologies they or their students have access to in their classrooms. Eighty individuals responded to this portion of the survey. For the purpose of this analysis, the term “accessible” refers to those computer technologies which are made available to art educators in their classrooms by their schools. The five technologies most often available, or acessible, in art classrooms were, in numerical order, computers, the Internet, LCD projectors, digital

cameras, and document cameras. The four least accessible technologies in art rooms, in descending order, were interactive whiteboards, tablets, digital video camera, and scanner (See Figure 7).

Figure 7: Computer Technologies in the Art Room

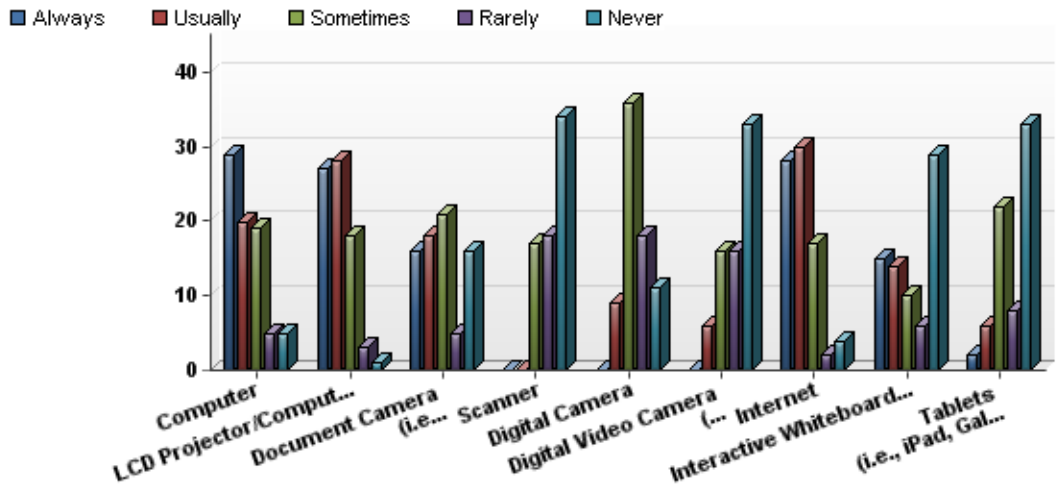


Using the same list of nine computer technologies mentioned earlier, respondents were asked to identify how often they utilized each computer technology by marking one of the following answer choices: Always, Usually, Sometimes, Rarely, and Never. Seventy-seven individuals responded to this portion of the survey. The top five technologies that were noted as being used either Always or Usually by respondents were, in numerical order from greatest to least, the Internet, as cited by 72.50% of respondents, LCD projectors (71.42%), Computers (63.63%), document cameras (45.33%), and intereactive whiteboards (39.19%) (See Figure 8). This data shows that 50% of respondents were Always or Usually using the Internet, LCD projectors, and Computers (See Figure 8).

In the Sometimes category regarding frequency of use, digital cameras received 36 responses (48.65%), followed by tablets with 22 responses (30.99%), and document

cameras with 21 responses (28.00%) (See Figure 8). From this data, it can be discerned that a majority of survey participants are using the Interent, LCD projectors, Computers, document cameras, digital cameras, and interactive whiteboards, at least sometimes (See Figure 8).

Figure 8. Frequency of Computer Technology Usage



In contrast, the survey data also demonstrated that other computer technologies were being used less frequently or never by survey participants. In order from greatest to least, the three technologies that most frequently tallied as being used Never, were scanners (49.28%), tablets (46.48%), digital video cameras (46.48%), and interactive whiteboards (39.19%) (See Figure 8). It is unclear how many of the Never responses were attributable to choice or the individual simply not having access to that particular computer technology. For example, when asked what technologies teachers have access to, the data shows that only 35 (44%) of the 80 teachers who responded to this question signified having access to a tablet (See Figure 7). This lack of access may account for the high percentage of Never responses in the frequency of use section on the survey.

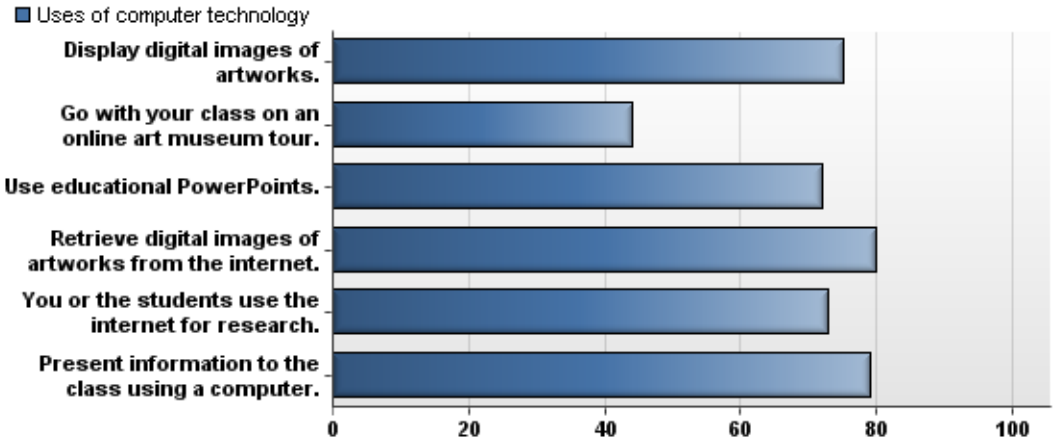
Similarly, Interactive whiteboards received a high rate of Never responses. This too may be attributable to a lack of access to this particular computer technology. In both instances it is difficult to gauge how much of the infrequency of use is due to accesibility issues or a decision by the art teacher not to use that particular tool. It is relevant to note that when asked later on in the the survey which computer technology resources art teachers deem most beneficial to their teaching, 31% of the responses to this open ended question mentioned interactive whiteboards, whereas another 11% of the responses cited tablets as being most beneficial to instruction. Taken together, these response highlight two computer tools that are considered beneficial by the teachers using them, but the issue for some teachers remains one of accessibility.

Following the survey section regarding computer technology frequency of use, survey participants were posed with the open ended question "What computer technologies do you as a teacher find most beneficial to your teaching." Seventy-five particpants completed this portion of the survey and a wide range of responses were provided. Some respondents mentioned more than one type of computer technology they considered most beneficial to their teaching. The following data reflects the percentage of survey responses that mentioned specific computer technologies as being most beneficial. Although other computer technologies may have been cited as being most beneficial to the teachers using them, this list includes only those technologies most frequently mentioned. Using percentages rounded up to the nearest percent, and in order from greatest to least, the following technologies were most often recorded as being beneficial to the teachers using them: LCD projectors (48%), document cameras (45%), interactive whiteboards (31%), desktop or laptop computers (27%), the Internet (27%), digital

cameras (21%), and tablets (11%). Based on this data, a correlation can be made between those computer technologies perceived as most beneficial and those computer technologies survey participants reported as using most often. In the above percentages, LCD projectors were most often cited as most beneficial, followed by document cameras, interactive whiteboards, computers, the Internet, digital cameras, and tablets. Similarly, on the frequency of computer technology usage chart (See Figure 8) the computer technologies most often utilized, those used always or usually, were comprised of a very similar list. The always or usually used computer technologies included the Internet, LCD projectors, computers, document cameras, and Interactive whiteboards. The similarity of these two lists, and the similarities between technologies teachers perceive as most useful and what they utilize most often, reflects a correlation in the data. This correlation implies a link between what teachers perceive as most beneficial and those computer technologies they use with greatest frequency.

In addition to being asked what types of computer technologies they have access to, teachers were asked how they are using those same technologies. Respondents were provided with six different scenarios of computer technology usage for instructional purposes, and asked to mark which of those uses of computer technology they have incorporated into their own teaching instruction (See Figure 9). The most popular use of computer technology for isntructional purposes was to "Retrieve digital images of artworks from the internet" (See Figure 9). The least common use of computer technology was to "Go with your class on an online art museum tour" (See Figure 9).

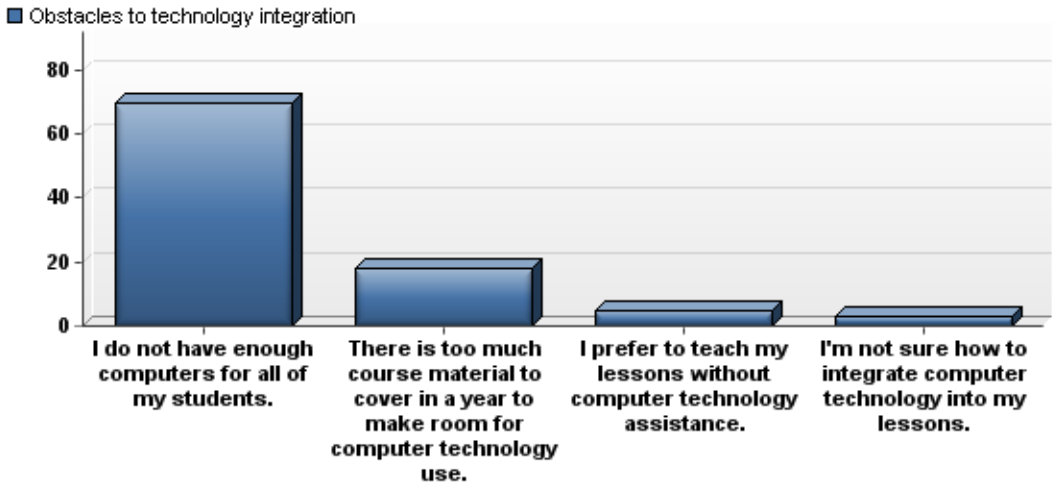
Figure 9. Uses of Computer Technology



In the next section of the survey, an open-ended format was chosen to help provide further insight into other ways teachers were using computer technology in the classroom. Survey participants were able to type open-ended responses. In answer to the question "What other ways have you as a teacher used computer technology in your lessons?" a wide range of responses were provided. From the forty-one individuals who answered this question, the following responses most often appeared in the data. The most frequently mentioned usage of computer technology, cited by 17% of respondents, was to use computer tools, such as computers, iPads, and various software, to create digital artworks. The second most common utilization of computer technology, mentioned by 15% of participants, was the use of online art galleries or forums, such as Artsonia, to post student artworks. Another 10% of survey particpants mentioned the utilization of streamed videos via educational websites, such as Discovery education and TeacherTube, to supplement the art curriculum.

The survey also examined the notion of obstacles to computer technology integration in art education. Participants were provided with four different circumstances that could function as barriers to technology integration in the classroom. Respondents were asked to "Place a mark in the box next to the following circumstances that limit how much you use computer technology in your classroom." The following data was collected: Seventy particpants marked "I do not have enough computers for all of my students", eighteen participants marked "There is too much course material to cover in a year to make room for computer technology use", five particpants marked "I prefer to teach my lessons without computer technology assistance", and three participants marked "I'm not sure how to integrate computer technology into my lessons (See Figure 10). From this data, it can be infered that too few computers is a primary obstacle to further technology integration for particpants of the survey.

Figure 10. Obstacles to computer technology integration



Survey particpants were also provided with an open-ended format to provide further feedback on barriers to integrating computer in the classroom. Participants were confronted with the question "What are some other obstacles you as a teacher have

encountered that have limited how you incorporate computer technology in your classroom?" Fifty-five responses were provided to this segment of the survey. Survey particpants cited a variety of perceived barriers to computer technology integration that touched on a broad range of issues. Some individual responses cited multiple barriers. The following sentiments were most often reflected in the data collected. "Computer labs are usually full and my class is not able to get into them. I only have one computer in my room", "I only have my teacher computer in my classroom and I wish the students had their own tablets", "The biggest obstacle is the availability of laptops to my students because I am on a seven day rotation", "I only have a desktop and LCD projector to use", and "Outdated computers for students use." Comments regarding a lack of computers, insufficient resources, or a lack of access to computers, were echoed by a number of significant portion of respondents. 44% of the survey particpants who responded to this section, mentioned some variation of the sentiment that access to computers was a barrier to full integration. The frequency of this sentiment in the open ended responses mimics the responses in the closed ended responses regarding barriers to computer technology integration. This data reflects a strong affinity by respondents to the notion that insufficient computer access is a prominent concern.

Another sentiment frequently expressed in the typed responses was the issue of short class times or a lack of time. Variations of the sentiment "When you see kids for thirty minutes once a week it is not sufficient time for students to engage on the computer" were echoed throughout the data. 29% of participants cited time as being a barrier to computer technology integration.

Other barriers to computer technology integration often cited in the data included: a perception that the general classrooms experience a first priority status thus resulting in first access and a diverting of computer technologies to those classrooms (13%), a lack of knowledge about computers and how to utilize them in the classroom (13%), and not enough training on ways to incorporate computer technology in instruction (11%).

CHAPTER 5: DISCUSSION, LIMITATIONS, AND FUTURE DIRECTIONS

Discussion

The results of this study did support the original hypothesis in which greater access to computer technology correlates with increased technology integration and teachers having more favorable beliefs about technology usage in the classroom. This finding is directly related to what Phelps and Jacka found when analyzing teachers' attitudes regarding ICT in that a majority of visual arts teachers believed ICT served an important role in art education, particularly in regards to student research (as cited in Wilks et al., 2012, p. 60). Art teachers in this study consistently reported having access to various types of computer technologies. Although there were access disparities amongst teachers, many reported having access to computers, the Internet, LCD projectors, digital cameras, and document cameras (See Figure 7), although not necessarily all six technologies at once. Access to these technologies provides teachers and students the opportunity to explore new digital possibilities, share artwork in online communities, and "make possible new forms of social interaction" (NAEA, 2009, p. 6). The social and collaborative aspects of the learning process made possible by new technologies (Quinn, 2011) is particularly relevant in today's 21st century art rooms.

The study results suggest that many art teachers from different regions of the state are working in classrooms that provide at the minimum a few of these computer technologies. The types and extent of computer technologies in those classrooms though can vary dramatically from room to room. The data confirms that access to computer technologies in today's North Carolina elementary art rooms is more the norm than an

exception. This is an encouraging sign because as others have noted, the more technologies and materials are provided in art classrooms, the more opportunities each student will have to express themselves (Roland, as cited in Ash, 2008).

Survey data provided useful insight into how different technologies were being utilized by art teachers and perceived barriers to using those computer technologies more frequently. Some of the obstacles mentioned by respondents included: lack of time, lack of training, and uncertainty of how to use. The last concern was also documented in research by Black & Browning (2011).

A primary obstacle cited in different parts of the survey was an insufficient number of computers. Delving into the open-ended responses on the survey it is apparent that a number of teachers perceive access to computers a continuing challenge. Similarly, respondents in Roland's (2007) survey cited a lack of adequate computers as a primary obstacle too. This concern was mentioned both in closed-ended and open-ended sections of the survey by a notable percentage of respondents. The relevance of this concern is important to consider as teachers are preparing students to be 21st century learners with 21st century skills. Skills required of today's learners such as media and technology literacy are outlined in Common Core State Standards (Common Core State Standards Initiative, 2010) and the North Carolina Information & Technology Essential Standards (ITES). As educational policy makers focus on what educators need to do with computer technologies (Delacruz, 2009), it is especially important that teachers are provided with adequate technology access.

By identifying inadequate numbers of computers as a primary obstacle to technology integration, respondents were also signifying a desire for greater access to

computer technologies. Although a lack of computer access was often cited as a primary barrier, this negative perception regarding instructional resources alternatively infers a positive outlook on the idea of computers in the classroom. Survey participants were expressing a desire for greater access to computers thus signifying a positive correlation between the computers teachers already have, which they've come to rely on, and a desire to acquire greater computer access. This positive outlook on computer technology echoes findings from other studies including a PBS LearningMedia survey (PBS LearningMedia Survey, 2012) that found teachers want more technology and view technology as beneficial to the learning process.

Despite obstacles, a decent number of computer technologies are available in many of today's art rooms and art teachers also seem to be utilizing those technologies for instructional purposes on a frequent basis. Of the computer technologies most commonly found in elementary art rooms, they also happen to be the computer technologies most frequently utilized (See Figures 7 & 8). It is unclear whether these computer technologies are used more frequently due to familiarity both in and out of school. For example, computers are commonplace in everyday life and such a familiarity may result in art teachers relying on them more often in the classroom or staying within their comfort zone (Prensky, 2005). Also, an argument can be made that some computer technologies, when made available, may lend themselves more naturally to art instruction. Document cameras and LCD projectors enable the display of images, a big component of the visual arts. Factors such as these may need to be explored further in future research.

According to the original hypothesis, greater access to computer technology correlates with increased technology integration and teachers having more favorable beliefs about technology usage in the classroom. The data showed that the original hypothesis was supported. Survey data demonstrated that many elementary art teachers are in frequent contact with various computer technologies (See Figure 8). Also, teachers consistently reported favorable attitudes regarding computer technology usage in art education (See Figures 4, 5, & 6). Similar favorable views regarding computer technology for instructional purposes were also reported by Roland (2007).

The results of this study did support the original hypothesis in which greater access to computer technology correlates with increased technology integration and teachers having more favorable beliefs about technology usage in the classroom. As schools across the United States have acquired more classroom technologies, teachers seem to be using those technologies more frequently. Parsad and Jones (as cited in Roland, 2010) call attention to a 2005 study by the National Center for Education Statistics which found that in 1994 only 3% of public schools reported having access to the Internet while by 2005 93% were online. This dramatic increase in Internet technology access has been documented in other studies along with high reporting rates of frequent Internet usage for classroom instruction (Roland, 2007). A recent PBS LearningMedia survey found that the utilization of the Internet to access websites was the most common technology tool used by the teachers polled (PBS LearningMedia Survey, 2013). Taken together, these studies suggest that when an instructionally useful computer technology such as the Internet becomes widely available, more teachers will utilize that technology.

Limitations

The results of this study cannot be used to make generalizations about all elementary North Carolina art teachers since the survey was conducted online. Additionally, survey results cannot be generalized to all classrooms across the state because more participants would be needed to make this study more generalizable. Despite these limitations, the findings of this survey provide valuable insight into the classroom experiences of art educators working with computer technology.

Future Directions

The data offers insight into the notion that some technologies are used less frequently than others. A few reasons contribute to computer technologies not being utilized including, lack of access, uncertainty of how to integrate the technology, and a desire to use more traditional teaching approaches. The data is telling in that many art educators, working in a profession often associated with traditional art making methods, are frequently using computer technologies and hold favorable views of computer technologies. The results could reflect a changing approach to teaching art education that blends material practice with greater access to more digitally based learning environments. It is unclear whether certain computer technologies are used more frequently in classrooms because they naturally lend themselves to instructional delivery or whether other factors such as teacher attitudes and comfort level with certain technologies play a bigger role. Future research may provide answers to these questions.

Conclusion

The trajectory of art education, and art pedagogy, both seem to reflect trends taking place elsewhere in education and society. Elementary art educators are embracing the potential of computer technologies in the classroom, and experimenting with ways to infuse computer technology into instructional practice. Similar to other educators, art teachers seem to be embracing the virtues of computer technologies, while simultaneously still relying on more traditional teaching methods. This blending of old and new has its benefits, students are exposed to traditional art making processes while becoming familiar with 21st century computer tools commonplace in modern life.

This research sought to address a number of questions pertaining to technology usage in elementary art classrooms in the state of North Carolina. The results from the data provided answers to the following questions. How are art teachers incorporating computer technology in instructional delivery? The data demonstrated that art teachers are using computer technologies in a multitude of ways including online art galleries of student work, digital art demonstrations, online research, collaboration, and digital image creation. Do art educators believe computer technology helps enhance instructional delivery? Yes, art teachers believe computer technology enhances classroom instruction. How frequently are art teachers using computer technologies? Most art teachers are using at least some technologies on a daily basis. What obstacles prevent art teachers from using computer technologies more often? Art teachers considered lack of computers, time constraints, and uncertainty of how to use different technologies the biggest obstacles to greater integration.

As more elementary art teachers acquire more and newer computer technologies, some educators will discover new ways to incorporate those technologies into teaching practice. Today, computers are prevalent in most schools and many schools in the upper grades are now providing one laptop per student. The data demonstrated that some North Carolina elementary art teachers have access to tablets, a device sometimes used for making digital artworks. It will be interesting to see how many art rooms move towards a one tablet per child approach as more teachers utilize digital tools for digital creativity. This type of access in the earlier grades to digital art making tools may be given greater emphasis in an increasingly digital world. As computer technology access increases throughout schools in general education, the natural progression would seem to be greater access in art rooms too.

What is taking place in North Carolina elementary art rooms is a snapshot of what is taking place in other states and countries throughout the world. In an age of globalization, computer technology has served as a major catalyst for an increasingly interconnected world. Fortunately, art educators have recognized the importance of computer technologies and are today infusing those computer technologies into the teaching process. Reflected in this research is a willingness on the part of art educators to find ways to incorporate computer technologies into the visual arts. This bodes well for the profession because it demonstrates openness to change and an ability to adapt to the times. Throughout history the visual arts have embraced new technologies, and this time appears to be no different.

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Appendices

Appendix A: IRB Approval Letter

EAST CAROLINA UNIVERSITY
University & Medical Center Institutional Review Board Office
4N-70 Brody Medical Sciences Building· Mail Stop 682
600 Moye Boulevard · Greenville, NC 27834
Office **252-744-2914** · Fax **252-744-2284** · **www.ecu.edu/irb**

Notification of Amendment Approval

Date: 4/10/2013
ID: Ame1 UMCIRB 12-002063

Title Amendment for IRB Study # UMCIRB 12-002063

The role of technology in the 21st century art room

Your Amendment has been reviewed and approved using expedited review for the period of 4/10/2013 to1/20/2014 . It was the determination of the UMCIRB Chairperson (or designee) that this revision does not impact the overall risk/benefit ratio of the study and is appropriate for the population and procedures proposed.

Please note that any further changes to this approved research may not be initiated without UMCIRB review except when necessary to eliminate an apparent immediate hazard to the participant. All unanticipated problems involving risks to participants and others must be promptly reported to the UMCIRB. A continuing or final review must be submitted to the UMCIRB prior to the date of study expiration.The investigator must adhere to all reporting requirements for this study.

The approval includes the following items:

Name	Description	Modified	Version
David Diehl Research Protocol | History	Study Protocol or Grant Application	3/26/2013 9:48 PM	0.02
Letter of Support | History	Consent Forms	3/27/2013 9:42 AM	0.01
research survey revised | History	Surveys and Questionnaires	3/26/2013 9:51 PM	0.05

The Chairperson (or designee) does not have a potential for conflict of interest on this study.

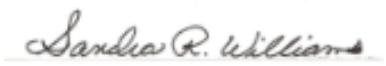
Appendix B: Letter of Consent from NCAEA President

Dear IRB of East Carolina University,

We are happy to be involved in David Diehl's research project to be completed in pursuit of his master's degree in art education through East Carolina. He has the full support of the NCAEA in conducting this research. This letter serves as official permission and support for this research on computer technology usage by North Carolina elementary art educators.

I understand that teacher data will be collected by survey completed by North Carolina art teachers and NCAEA members, and am happy to advertise this survey through NCAEA communication avenues. The degree of risk to teachers is minimal to none and participation is voluntary. Teacher privacy will be protected and confidentiality has been guaranteed. If there is anything further we can do to help, please let me know.

Sincerely,



Sandra Williams
NCAEA President

Appendix C: Survey of Teachers' Attitudes Toward Using Computer Technology

Default Block

ECU IRB Project #: 12-002063
University Institutional Review Board
Phone: 252-744-2914

To the Educator:

My name is David Diehl and I am a graduate student pursuing my Master of Arts in Education in art education through East Carolina University. Part of my graduate research includes conducting surveys with North Carolina elementary art teachers. The research I am conducting will examine the role of computer technology in the 21st century art room by focusing on how North Carolina elementary art teachers are using computer technology in their classrooms. Data collected through surveys will provide insight into teachers' perceptions of computer technology, what types of computer technology are most frequently utilized in the art room, and which forms of computer technology are considered most effective by the teachers using them. By doing this research, I hope to learn how art teachers are utilizing computer technology and what forms of integration seem to work best.

This survey is composed of well-validated portions of several attitudinal surveys that have been used with teachers in the past. We will use the combined information to help develop a profile of how teachers view technology. Please complete all items even if you feel that some are redundant. This may require 10-15 minutes of your time. Usually it is best to respond with your first impression, without giving a question much thought. Your answers will remain confidential. In this survey, computer technology refers to…computers (desktops, laptops, related hardware and software), peripherals (digital cameras, tablets, interactive whiteboards, LCD projectors, etc.) and all their uses (word processing, Internet use, web-based programs, etc.).

Thank you for your cooperation!

How many years have you been teaching, including this year?

- ☐ 1 year
- ☐ 2-4 years
- ☐ 5-10 years
- ☐ 11-15 years
- ☐ 16-20 years
- ☐ Over 20 years

Please mark the range of your age.

- ◯ 20-30
- ◯ 31-40
- ◯ 41-50
- ◯ 51-60
- ◯ 61+

What is your gender?

- ◯ Male
- ◯ Female

Instructions: Please read each statement and mark the response that best conveys your beliefs about that statement.

S = Strongly Agree; SA = Somewhat Agree; U = Undecided; SD = Somewhat Disagree; D = Strongly Disagree

	S	SA	U	SD	D
The challenge of learning about computers is exciting.	☐	☐	☐	☐	☐
I would like to learn more about computers.	☐	☐	☐	☐	☐
Computers are not exciting.	☐	☐	☐	☐	☐
I get a sinking feeling when I think of trying to use a computer.	☐	☐	☐	☐	☐
Computers frustrate me.	☐	☐	☐	☐	☐

Instructions: Please read each statement and mark the response that best conveys your beliefs about that statement.

S = Strongly Agree; SA = Somewhat Agree; U = Undecided; SD = Somewhat Disagree; D = Strongly Disagree

	S	SA	U	SD	D
I have a lot of self confidence when it comes to working with computers.	☐	☐	☐	☐	☐
Computers are difficult to understand.	☐	☐	☐	☐	☐
I feel comfortable working with a computer.	☐	☐	☐	☐	☐
Learning to operate computers is like any new skill - the more you practice, the better you become.	☐	☐	☐	☐	☐
Knowing how to use computers is a worthwhile skill.	☐	☐	☐	☐	☐

Instructions: Please read each statement and mark the response that best conveys your beliefs about that statement.

S = Strongly Agree; SA = Somewhat Agree; U = Undecided; SD = Somewhat Disagree; D = Strongly Disagree

	S	SA	U	SD	D
I feel computers are necessary tools in both educational and work settings.	☐	☐	☐	☐	☐
If I had to use a computer for some reason, it would probably save me some time and work.	☐	☐	☐	☐	☐
Computers can be used successfully with courses which demand creative activities.	☐	☐	☐	☐	☐
Teacher training should include instructional applications of computers.	☐	☐	☐	☐	☐
I'll need a firm mastery of computers for my future work.	☐	☐	☐	☐	☐

Place a mark in each box for the computer technologies you as a teacher and/or your students use in the classroom

	Teacher	Student
Computer	☐	☐
LCD Projector/Computer Projector System	☐	☐
Document Camera (i.e., Elmo, Lumens Ladibug, etc.)	☐	☐
Scanner	☐	☐
Digital Camera	☐	☐
Digital Video Camera (i.e., Flip Camera, Sony Handycam, etc.)	☐	☐
Internet	☐	☐
Interactive Whiteboard (i.e., SmartBoard, Prometheum Activinspire, etc.)	☐	☐
Tablets (i.e., iPad, Galaxy, etc.)	☐	☐

List other computer technologies that <u>you</u> as a teacher have access to or use that are not listed.

List other computer technologies that <u>your students</u> have access to or use that are not listed.

	Always	Usually	Sometimes	Rarely	Never
Computer	☐	☐	☐	☐	☐
LCD Projector/Computer Projection System	☐	☐	☐	☐	☐
Document Camera (i.e., Elmo, Lumens Ladibug, etc.)	☐	☐	☐	☐	☐
Scanner	☐	☐	☐	☐	☐
Digital Camera	☐	☐	☐	☐	☐
Digital Video Camera (i.e., Flip Camera, Sony Handycam, etc.)	☐	☐	☐	☐	☐
Internet	☐	☐	☐	☐	☐
Interactive Whiteboard (i.e., SmartBoard, Prometheen Activinspire, etc.)	☐	☐	☐	☐	☐
Tablets (i.e., IPad, Galaxy, etc.)	☐	☐	☐	☐	☐

What computer technologies do you as a teacher find most beneficial to your teaching? (i.e., digital camera, document camera, etc.)

Place a mark in the box next to the following uses of computer technology that you have incorporated into your lessons.

	Uses of computer technology
Display digital images of artworks.	☐
Go with your class on an online art museum tour.	☐
Use educational PowerPoints.	☐
Retrieve digital images of artworks from the internet.	☐
You or the students use the internet for research.	☐
Present information to the class using a computer.	☐

What other ways have you as a teacher used computer technology in your lessons?

Place a mark in the box next to the following circumstances that limit how much you use computer technology in your classroom.

	Obstacles to technology integration
I do not have enough computers for all of my students.	☐
There is too much course material to cover in a year to make room for computer technology use.	☐
I prefer to teach my lessons without computer technology assistance.	☐
I'm not sure how to integrate computer technology into my lessons.	☐

What are some other onstacles you as a teacher have encountered that have limited how you incorporate computer technology in your classroom?

Other Comments: